

7.4 SYSTEMS REQUIRED FOR SAFE SHUTDOWN

The process of attaining safe shutdown in accordance with Branch Technical Position RSB 5-1 is described in Section 5.5. Equipment for attaining safe shutdown from outside the Control Room is discussed in the following sections.

7.4.1 Hot Shutdown Outside the Control Room

The probability of the Control Room becoming inaccessible as a result of any cause is considered extremely small. If the operator must leave the Control Room, however, operating procedures require that he trip the reactor and turbine generator prior to leaving, thus ensuring control at the hot shutdown control stations. If necessary, the required trips can be accomplished at locations outside the Control Room.

The reactor unit can be maintained in a hot shutdown condition from the hot shutdown control stations. The following control features are provided:

1. Core residual heat removal
2. Boration of the Reactor Coolant System
3. Pressurizer level and pressure control
4. Containment fan cooler operation

These functions require the operation of auxiliary feedwater pumps, charging pumps, boric acid transfer pumps, service water pumps, and containment fan cooler units. Appropriate process instrumentation such as pressurizer pressure and level, steam generator pressure and level, component cooling flow, and service water pressure are provided. This equipment is sufficient to safely maintain the unit in a hot shutdown condition for an extended period of time.

7.4.2 Cold Shutdown Outside the Control Room

There is no reason to assume any significant damage to equipment in the Control Room area nor is there any reason to believe that access to the Control Room could not be regained during the extended period of hot shutdown. However, we believe the plant design does not preclude the possibility of bringing the reactor to a cold shutdown condition from outside the Control Room. On a long-term basis (a week or more) an assessment of plant conditions could be made and methods established for making physical changes to instrumentation and control equipment as necessary to permit cold shutdown. The systems and equipment which would be utilized to attain cold shutdown, assuming no significant damage to equipment in the Control Room area, are given below:

Process Systems

1. Heat removal - natural or forced circulation (reactor coolant pumps)
 - a. Controlled steam release and feedwater supply
 - b. Residual Heat Removal System
2. Boration capability
3. Nuclear Instrument System
 - a. Source range and intermediate range
4. Reactor coolant inventory control
 - a. Charging and letdown
5. Pressurizer pressure control
 - a. Heaters

- b. Spray
 - c. Relief valves
6. Control air service

Equipment

1. Reactor coolant pump
2. Auxiliary feedwater pumps
3. Boric acid transfer pumps
4. Charging pumps
5. Service water pumps
6. Containment fan coolers
7. Control Room air conditioning
8. Component cooling pumps
9. Residual heat removal pumps
10. Certain motor control center and switchgear sections

Instrumentation

1. Pressurizer
 - a. Level indicators
 - b. Pressure indicators
2. Steam Generators

- a. Level indicators
- b. Pressure indicators
3. Reactor coolant wide range temperature indicators
4. Reactor coolant wide range pressure indicators
5. Source range indication
6. Intermediate range indication
7. Component cooling water temperature indication
8. Reactor coolant pump instrumentation
9. Residual Heat Removal System instrumentation
10. Radiation monitors

Controls

Controls are required for all equipment listed above, and also the following:

1. Steam dump control (for atmospheric relief valve and condenser steam dump valve)
2. Feedwater supply
3. Manual control of residual heat removal throttle valves
4. Makeup of reactor coolant shrinkage by manual control of charging
5. Pressurizer heater on/off controls

6. Pressurizer relief valves
7. Pressurizer auxiliary spray open/close control
8. Reactor coolant pump oil lift pump
9. Open/close switch control of letdown isolation valve
10. Safeguards controls
 - a. Defeat Safety Injection System automatic operation